Recycled Energy

RPS Working Group
April 5, 2005

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But First…Who is Primary Energy?

- Primary Energy ("PE") is a developer, owner and operator of on-site energy recycling and CHP facilities
- Extensive energy operations experience
- Currently own six inside-the-fence energy projects highly integrated into steel mill hosts in Northwestern Indiana and six gas-fired CHP projects in California, Colorado and New Jersey
- Headquartered in Oak Brook, Illinois
- www.primaryenergy.com

What is Recycled Energy?

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RECYCLED ENERGY. The term "recycled energy" means useful thermal, mechanical or electrical energy produced from:

- *exhaust heat from any commercial or industrial process;*
- *waste gas, waste fuel or other forms of energy that would otherwise be flared, incinerated, disposed of or vented; and*
- *electricity or equivalent mechanical energy extracted from a pressure drop in any gas, (excluding any pressure drop to a condenser that subsequently vents the resulting heat).*

Equivalent Environmental Benefits to "Traditional" Renewables

- Energy can be produced with no incremental fossil fuel inputs
- No incremental fuel = No incremental emissions

- Additional benefit is that in most cases the energy will be used at or near the point of production, minimizing the loses associated with transmission and distribution

Recycled Energy Projects Substitute Knowledge and Capital for Fuel

- Displace use of fossil fuel or purchased energy by capturing and using currently wasted, local energy resources
- Typically requires energy and process engineering
- Capital investments required for hardware and controls
- Often not part of the end users core business or competency

Key Customer Benefits of Recycled Energy

- Save $
- Significant reductions in emissions are possible
  - Both onsite and displacement of purchased energy
- Benefits common to all distributed generation (DG) technologies
  - Enhanced reliability & energy security

Recycled Energy Technologies

Many Technologies Off The Shelf

- A few examples:
  - Waste Heat Recovery Boilers
  - Gas Holders with fired boilers, engines or turbines
  - Backpressure Turbines (steam)
  - Expander Turbines (other gases and liquids)
- Lots more that people in the industry can access, especially for niche uses – look to Europe and other countries where energy prices have been consistently high

Waste Heat Recovery Boilers

- Recoverable heat from furnaces, stoves, thermal oxidizers, and other processes
- Heat recovered used to produce steam or hot water
- Can be connected to a steam turbine to generate electricity or used for process or space heat

Gas Holders

- Replacing flares with gas holders can achieve same environmental result while allowing energy capture
- Many low to medium Btu gases produced in batch processes can be captured and used, much like landfill gas projects
- Stored fuel can be used by many traditional combustion technologies, producing electricity and/or thermal energy

Back-Pressure Steam Turbine

Expander Turbines

- Same idea as a backpressure turbine but used in natural gas distribution systems, or other high pressure transmission to distribution environments

Case Studies

Cokenergy, LLC.

(A Primary Energy Project)

- ***Customer:*** Mittal Steel (formerly Ispat Inland)
- ***Location:*** East Chicago, Indiana
- ***Capacity***: 95 MW electric, 930,000 lbs/hr steam
- ***Benefits:***
  - Supplies 21% of the electrical requirements and 85% of the plant's process steam needs
- ***Awards:*** 2000 Governor's Award for Excellence in Pollution Prevention

Crane Paper Company

CHP Installation

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